

## DYNAMICALLY TUNABLE RESONATOR FOR USE IN A CHROMATIC DISPERSION COMPENSATOR

### Abstract

A tunable etalon for use in a dispersion compensator according to the present invention includes a Gires-Tournois (GT) etalon with a variably reflective front mirror section and a fixed back mirror section defining a resonance cavity therebetween. The front mirror section includes one or more tunable gaps formed  
5 between pairs of partially reflective mirrors and filled with a material with a variable index of refraction, e.g. liquid crystal. Due to the variability of the material's refractive index, the reflectivity of the tunable cavity can be adjusted by inducing an electric field using a controllable voltage source. With such a variable reflectivity, the time (group) delay among frequency components of input light can  
10 be adjusted and varied within a range of a few milliseconds or less, such that chromatic dispersion can be tuned dynamically. A pair of such etalons, which have equal and opposite dispersion curves, can achieve a wide flat range of dispersion. A plurality of etalons, connected in series, can achieve a greater range of tunable dispersion. A similar dispersion compensator can be formed using a  
15 ring resonator with a variable coupler.